

# INDEX TO VOLUME 21

## Authors

A	
Abbott, M. M.	62, 72
Abrams, Denis S.	116
Adler, R. J.	965, 974
Agrawal, Satish	449, 594
Aiken, R. C.	817, 1227
Ajinkya, Milind	1236
Allan, Donald S.	413
Amick, E. H., Jr.	1142
Anderson, John L.	1176
Andre, H.	686, 691
Anshus, B. E.	190
Arciero, Steven	872
Arumugam, M.	613
Ashurst, William T.	410
Atherton, R. W.	441
Avenas, Pierre	791

B	
Bailey, J. E.	192
Bailley, M.	1040
Bakshi, K. R.	494
Balakrishnan, Chander	1225
Barnett, Stanley M.	623
Bassett, Charles E.	699
Becker, H. A.	238, 949
Beegle, B.	826
Beilke, Siegfried	402
Benke, Neill D.	1210
Beret, S.	1123
Bernath, Louis	414
Bhattacharyya, D.	879, 1057
Biddulph, Michael W.	41, 327
Blander, Milton	560, 833
Blau, G. E.	854
Bodman, Samuel W.	414
Boger, D. V.	540, 550
Bonnett, W. S.	901
Booth, B. D.	949
Branson, D. R.	854
Brelvi, S. Waseem	157, 171, 1024
Broadhurst, T. E.	238
Brodkey, Robert S.	1165
Bromley, Leroy A.	391, 600
Broyer, E.	198

C	
Cabelli, A.	540
Calus, W. F.	599
Caracciolo, Frank	160
Carnaham, Norman F.	168
Carrood, P. A.	1080
Carter, J. W.	380
Chandra, Krishna	1029
Chandrasekaran, S. K.	985
Chandrasekhar, Sivam	103
Chappelear, Patsy S.	173
Charpentier, Jean-Claude	1213
Chavan, V. V.	613
Cheh, H. Y.	1142
Chen, H. T.	813
Chen, Tien-Tsung	397
Christiansen, E. B.	999
Christiansen, Lars J.	49
Chu, K. J.	583
Chu, T.-C.	173

Churchill, Renate U.	604
Churchill, Stuart W.	604
Clay, David T.	466
Cocchetto, Joseph F.	1107
Colton, Clark K.	289
Cooper, W. T.	1189
Cordonnier, Michel	822
Crowe, C. M.	528
Cullinan, Harry T., Jr.	195, 554, 571, 575
Cummings, Daniel L.	90
Cussler, E. L.	160

D	
Darling, Robert C.	1006
Davies, J. E.	599
Davis, E. James	872
Davy, Chris A. E.	1218
Day, John	1080
Delancey, George B.	96
Del Casal, E. P.	615
D'Emidio, V. J.	813
Denn, Morton M.	791
DePriester, C. L.	1235
Dogu, Gulsen	58
Doraiswamy, L. K.	501
Douglas, J. M.	917, 924
Downey, John A.	1006
Drake, Elisabeth M.	413
Ducot, E. R.	441
Duda, J. L.	894
Dukler, A. E.	583
Dullien, Francis A. L.	299, 820

E	
Edwards, Thomas J.	248
Esmail, M. Nabil	958
Estrin, J.	392
Eubank, Philip T.	1111
Evans, D. Fennell	160
Evans, Lawrence B.	1158

F	
Fabries, Jean-François	735
Fan, L. T.	1233
Favier, Michel	1213
Felder, R. M.	1115
Fell, Christopher J. D.	1019, 1210
Floess, J. K.	72
Foo, S. C.	1149
Ford, D. E.	1230
Forbes, Melvin	763
Fredenslund, Aage	49, 1086
Freeman, R. A.	436
Friedman, Y.	77, 83
Froment, G. F.	1041, 1065

G	
Gaddy, J. L.	436
Gale, R.	1073
Gandhi, Satish L.	677
Garg, D. R.	200
Garrison, D. A.	1057
Gauvin, W. H.	143, 879, 1132
Gavalas, George R.	206, 494
Genna, Peter L.	656
Gidaspow, Dimitri	206
Goldstein, W. E.	229

Golikeri, Sudhir V.	865
Gordon, K. J.	1027
Gordon, R. J.	1225
Goto, Shigeo	706, 714
Graves, David J.	1037
Grens, Edward A. II	136
Greskovich, Eugene J.	1022, 1189
Grieves, R. B.	1057
Grolmes, M. A.	308
Grossman, Gershon	720
Guccione, John	622
Guertin, Earl W.	206
Guin, James A.	396
Gunkel, Alfred A.	931
Gutfinger, C.	198

H	
Haas, Paul A.	383
Hall, Kenneth R.	406, 1111
Halmos, A. L.	540, 550
Hamrin, Charles E., Jr.	782, 807
Han, Chang Dae	449
Happel, John	602
Haselden, Geoffrey G.	1218
Hedman, Paul O.	372
Hegedus, L. Louis	849
Heidemann, Robert A.	824
Hellums, J. D.	743
Henley, Ernest J.	677
Hill, F. B.	1115
Himmelblau, D. M.	479
Hoelscher, Harold E.	103
Hoffman, Lee A.	318
Hoover, William G.	410
Hsu, Chia-Jung	627
Huckaba, Charles E.	1006
Hughmark, G. A.	170, 187, 597, 1033
Hummel, Richard L.	958
Humphreys, William W.	268
Hung, Scott C.	872

I	
Ishii, M.	308

J	
Jameson, G. J.	730
Jarzebski, C. M.	894
Jeffreys, G. V.	910
Johnson, Ernest F.	204
Jolls, Kenneth R.	259
Jones, Russell L.	1086
Joseph, B.	965, 974
Jumawam, A. B., Jr.	1057

K	
Kapur, D. N.	184
Kata, S.	143
Katz, Joseph L.	833
Kenner, Richard C., Jr.	1022
Kershenbaum, Lester S.	1220
Kesler, Michael G.	510, 1040
Kidon, William E.	1200
King, C. Judson	400
Klink, A. E.	1142
Kobayashi, Riki	168, 173
Koch, T. A.	1235

# INDEX TO VOLUME 21

## Authors

A	
Abbott, M. M.	62, 72
Abrams, Denis S.	116
Adler, R. J.	965, 974
Agrawal, Satish	449, 594
Aiken, R. C.	817, 1227
Ajinkya, Milind	1236
Allan, Donald S.	413
Amick, E. H., Jr.	1142
Anderson, John L.	1176
Andre, H.	686, 691
Anshus, B. E.	190
Arciero, Steven	872
Arumugam, M.	613
Ashurst, William T.	410
Atherton, R. W.	441
Avenas, Pierre	791

B	
Bailey, J. E.	192
Bailley, M.	1040
Bakshi, K. R.	494
Balakrishnan, Chander	1225
Barnett, Stanley M.	623
Bassett, Charles E.	699
Becker, H. A.	238, 949
Beegle, B.	826
Beilke, Siegfried	402
Benke, Neill D.	1210
Beret, S.	1123
Bernath, Louis	414
Bhattacharyya, D.	879, 1057
Biddulph, Michael W.	41, 327
Blander, Milton	560, 833
Blau, G. E.	854
Bodman, Samuel W.	414
Boger, D. V.	540, 550
Bonnett, W. S.	901
Booth, B. D.	949
Branson, D. R.	854
Brelvi, S. Waseem	157, 171, 1024
Broadhurst, T. E.	238
Brodkey, Robert S.	1165
Bromley, Leroy A.	391, 600
Broyer, E.	198

C	
Cabelli, A.	540
Calus, W. F.	599
Caracciolo, Frank	160
Carnaham, Norman F.	168
Carrood, P. A.	1080
Carter, J. W.	380
Chandra, Krishna	1029
Chandrasekaran, S. K.	985
Chandrasekhar, Sivam	103
Chappelear, Patsy S.	173
Charpentier, Jean-Claude	1213
Chavan, V. V.	613
Cheh, H. Y.	1142
Chen, H. T.	813
Chen, Tien-Tsung	397
Christiansen, E. B.	999
Christiansen, Lars J.	49
Chu, K. J.	583
Chu, T.-C.	173

Churchill, Renate U.	604
Churchill, Stuart W.	604
Clay, David T.	466
Cocchetto, Joseph F.	1107
Colton, Clark K.	289
Cooper, W. T.	1189
Cordonnier, Michel	822
Crowe, C. M.	528
Cullinan, Harry T., Jr.	195, 554, 571, 575
Cummings, Daniel L.	90
Cussler, E. L.	160

D	
Darling, Robert C.	1006
Davies, J. E.	599
Davis, E. James	872
Davy, Chris A. E.	1218
Day, John	1080
Delancey, George B.	96
Del Casal, E. P.	615
D'Emidio, V. J.	813
Denn, Morton M.	791
DePriester, C. L.	1235
Dogu, Gulsen	58
Doraiswamy, L. K.	501
Douglas, J. M.	917, 924
Downey, John A.	1006
Drake, Elisabeth M.	413
Ducot, E. R.	441
Duda, J. L.	894
Dukler, A. E.	583
Dullien, Francis A. L.	299, 820

E	
Edwards, Thomas J.	248
Esmail, M. Nabil	958
Estrin, J.	392
Eubank, Philip T.	1111
Evans, D. Fennell	160
Evans, Lawrence B.	1158

F	
Fabries, Jean-François	735
Fan, L. T.	1233
Favier, Michel	1213
Felder, R. M.	1115
Fell, Christopher J. D.	1019, 1210
Floess, J. K.	72
Foo, S. C.	1149
Ford, D. E.	1230
Forbes, Melvin	763
Fredenslund, Aage	49, 1086
Freeman, R. A.	436
Friedman, Y.	77, 83
Froment, G. F.	1041, 1065

G	
Gaddy, J. L.	436
Gale, R.	1073
Gandhi, Satish L.	677
Garg, D. R.	200
Garrison, D. A.	1057
Gauvin, W. H.	143, 879, 1132
Gavalas, George R.	206, 494
Genna, Peter L.	656
Gidaspow, Dimitri	206
Goldstein, W. E.	229

Golikeri, Sudhir V.	865
Gordon, K. J.	1027
Gordon, R. J.	1225
Goto, Shigeo	706, 714
Graves, David J.	1037
Grens, Edward A. II	136
Greskovich, Eugene J.	1022, 1189
Grieves, R. B.	1057
Grolmes, M. A.	308
Grossman, Gershon	720
Guccione, John	622
Guertin, Earl W.	206
Guin, James A.	396
Gunkel, Alfred A.	931
Gutfinger, C.	198

H	
Haas, Paul A.	383
Hall, Kenneth R.	406, 1111
Halmos, A. L.	540, 550
Hamrin, Charles E., Jr.	782, 807
Han, Chang Dae	449
Happel, John	602
Haselden, Geoffrey G.	1218
Hedman, Paul O.	372
Hegedus, L. Louis	849
Heidemann, Robert A.	824
Hellums, J. D.	743
Henley, Ernest J.	677
Hill, F. B.	1115
Himmelblau, D. M.	479
Hoelscher, Harold E.	103
Hoffman, Lee A.	318
Hoover, William G.	410
Hsu, Chia-Jung	627
Huckaba, Charles E.	1006
Hughmark, G. A.	170, 187, 597, 1033
Hummel, Richard L.	958
Humphreys, William W.	268
Hung, Scott C.	872

I	
Ishii, M.	308

J	
Jameson, G. J.	730
Jarzebski, C. M.	894
Jeffreys, G. V.	910
Johnson, Ernest F.	204
Jolls, Kenneth R.	259
Jones, Russell L.	1086
Joseph, B.	965, 974
Jumawam, A. B., Jr.	1057

K	
Kapur, D. N.	184
Kata, S.	143
Katz, Joseph L.	833
Kenner, Richard C., Jr.	1022
Kershenbaum, Lester S.	1220
Kesler, Michael G.	510, 1040
Kidon, William E.	1200
King, C. Judson	400
Klink, A. E.	1142
Kobayashi, Riki	168, 173
Koch, T. A.	1235

Koh, Wei-Hu	1176
Komiyama, Kiroshi	664, 670
Kosanovich, George	195
Krantz, William B.	179, 596
Kulkarni, B. D.	501
Kwon, Young D.	1158

## L

Lai, Chung-Jung	289
Lamb, Dennis	402
Lapidus, Leon	817, 1227
Lawn, Francois	822
Lee, Byung Ik	510, 1040
Lee, Douglas D.	979
Lemcoff, N. O.	730
Leppard, W. R.	999
Lin, S. P.	178, 594, 775
Liu, W. C.	775
Lo, Ching-Tsan	1223
Loffler, Daniel G.	786
Louizos, N.	554
Luss, Dan	318, 865
Luus, Rein	207, 567
Lynch, Edmond B.	799
Lynn, Scott	466, 763

## M

Ma, Yi Hua	335, 344
Macleod, N.	184
Madsen, Niels	607, 609
Mady, M. H.	283
Martens, K. M.	207
Mariyama, Roshio	1035
Masliyah, Jacob H.	805
Matsuura, T.	1209
Mayer, Jerome F.	1100
McAvoy, John J., Jr.	615
McCabe, W. L.	351, 1017
McFeeley, John J.	259
McIntire, Larry V.	901
McKelvey, Kenneth N.	1165
McMichael, W. J.	743
McNeese, L. E.	1080
Mendez, Francisco	534
Mendiratta, S. K.	1115
Merchuk, Jose C.	815
Merrill, Edward W.	414
Merry, J. M. D.	507
Michaels, A. S.	985, 1073
Miller, Clarence A.	474
Miller, R. C.	283
Mizushima, Tokuro	1035
Modell, M.	826, 1100
Mohan, V.	752
Mori, S.	109
Motard, R. L.	417, 656
Mumford, C. J.	910
Munz, R. J.	1132
Mutharasan, Rajakkannu	567
Myerson, Allan S.	1111

## N

Narayanan, S.	1065
Neale, G.	805
Neely, W. B.	854
Newell, J. S.	479
Newman, John	25, 248
Nishio, M.	528
Nixon, William E.	1111
Notter, R. H.	169

## O

O'Connell, John P.	157, 171, 1024
Osburn, James O.	1038

## P

Pan, W. P.	283
Patel, Rutton D.	259, 1036
Patterson, G. K.	358
Paybarah, A.	554
Peltre, Philippe R.	335, 344
Pendergrass, John	487
Petrie, Christopher J. S.	275, 791
Phinney, Ralph E.	996
Pinczewski, W. Val	1019, 1210
Pommersheim, James M.	1022, 1029
Popadic, V. O.	610, 861
Porteous, William	560
Poveromo, J. J.	769
Povich, Michael J.	1016
Powers, Gary J.	90, 623
Prasher, Brahm D.	396, 407
Prather, R.	1073
Prausnitz, John M.	116, 248, 1086, 1123
Prober, Richard	1200
Pulvermacher, B.	128
Pye, John J.	1200

## R

Rademaker, O.	388
Rader, C. G.	176
Radin, I.	358
Raghuraman, J.	752
Ramirez, W. Fred	799
Rathore, Ram N. S.	90
Ray, Parthasarathi	600
Read, Stanley M.	391
Reichenberg, Daniel	181
Reid, Robert C.	206, 414, 826
Reklaitis, G. V.	77, 83
Renon, Henri	735
Rice, R. G.	1149
Righter, William M.	406
Rijckaert, M. J.	207
Ritter, R. A.	686, 691
Rodrigo B., Fernando R.	885
Roger, Maurice	1207
Rosen, E. M.	417
Ross, John R.	203
Rousseau, R. W.	351, 1017
Ruckenstein, E.	128, 190, 756
Ruthven, D. M.	200

## S

Sandall, Orville C.	534
Satterfield, Charles N.	209, 289, 1100, 1107
Schanker, R. B.	441
Schmidt, Lanny D.	786
Schmitz, Roger A.	622
Schroeder, Hans G.	807
Schuetz, R. Wade	1192
Seader, J. D.	885
Seinfeld, John H.	412
Sena, Manuel P.	1220
Sephton, Hugo H.	400
Sethy, Anil	571, 575
Shacham, M.	417
Shaffer, A. G., Jr.	782
Sharma, Shanmuk	318
Shaw, J. E.	985
Sheih, Ching Ming	153
Skelland, A. H. P.	861
Sleicher, C. A.	169
Smith, E. P.	965
Smith, J. M.	58, 664, 670, 706, 714, 1209
Smith, J. W.	623
Smoot, L. Douglas	372
Solbrig, Charles W.	203
Song, Y. H.	924
Sorensen, Jan P.	206

Standart, G. L.	554
Starks, Charles M.	1038
Stevenson, James F.	1192
Stewart, W. E.	206
Stournaras, Constantinos	385
Su, Goug-Jen	397
Szekely, J.	769

## T

Tadmor, Z.	198
Taheri, Mansoor	153
Tai, C. Y.	351, 1017
Tam, Hak-Shing	1006
Tan, Allen Y.	396
Tavlarides, L. L.	623
Teja, A. S.	618
Thomas, Daniel	822
Tiedemann, William	25
Tiller, Frank M.	622
Ting, Robert Y.	810
Tondeur, D.	1040
Toner, Richard K.	1038
Tsao, George T.	979
Tsonopoulos, Constantine	827

## U

Ulbrecht, J.	613, 1230
Upadhye, Ravindra S.	136

## V

Valdes-Krieg, Ernesto	400
Van Damme, P.	1065
Van Ness, H. C.	62, 72
Vavanellos, T.	756
Verhoff, F. H.	229
Verma, Surjit L.	96
Villiermaux, Jacques	1207
Virk, P. S.	625
Vlachopoulos, John	385
Von Deak, Michael A.	1192
Voskamp, J. H.	388
Vrentas, J. S.	894

## W

Wall, James W.	413
Wallis, J. P. A.	686, 691
Walsh, G. E., Jr.	72
Wang, M. L.	392
Wang, R. H.	1233
Wasan, D. T.	752
Watson, J. S.	1080
Weber, Martin E.	931
Weinberg, Mark	1192
Weisz, Paul B.	1037
Weller, S. W.	176
Welty, James R.	268, 699
Wen, C. Y.	109
White, Daniel, Jr.	1027
Wilkinson, David	910
Williams, Michael C.	1, 1204
Wong, P. S. L.	1073
Wyman, Charles F.	404

## XYZ

Yang, Wen-Ching	1013
Yieh, Heh-Nien	1165
Youngquist, G. R.	392
Yu, K. M.	917
Zakanycz, Stephen	1165
Zakin, J. L.	358
Zweibel, Imre	1040

# Titles

## A

- Additional Comments on the Spatial Formulation of the Orr-Sommerfeld Equation for Thin Liquid Films ..... 179
- Additional Comments on Spatially Growing Disturbances in Liquid Films ..... 596
- Advances in Preconcentration and Dehydration of Feeds (Book Review) ..... 622
- Analogy for Heat Transfer with Wavy/Stratified Gas-Liquid Flow, An ..... 872
- Analysis of the High Pressure Polyethylene Tubular Reactor with Axial Mixing ..... 449
- Analysis of Time-Delay Systems by Series Approximation ..... 567
- Analysis of Turbulent Pipe Flow for a Viscoelastic Fluid, An ..... 597
- Analysis of Turbulent Pipe Flow with Viscosity Variation in the Wall Region, An ..... 187
- Application of the Method of Moments to Rate Tracer Studies of Heterogeneous Catalysis ..... 602
- Approach to Mechanism Discrimination in Free-Radical Reactions, An ..... 1220

## B

- Behavior of a Power-Law Fluid Flowing Through a Sudden Expansion: Part I. A Numerical Solution ..... 540
- Part II. Experimental Verification ..... 550
- Benzene and Its Industrial Derivatives (Book Review) ..... 1235
- Benzoin- and Benzoin Methyl Ether-Sensitized Photopolymerization of Styrene and Methyl Methacrylate: Quantum Yields and Mixing Effects ..... 1115
- Biochemical Reactors (Book Review) ..... 1037
- Bisphenol A Synthesis: Kinetics of the Phenol-Acetate Condensation Reaction Catalyzed by Sulfonic Acid Resin (Erratum) ..... 206
- Blending of Polymer Solutions With Different Rheological Properties ..... 1230
- Breakup of a Turbulent Liquid Jet in a Low-Pressure Atmosphere ..... 996
- Bubble Nucleation in Liquids ..... 833

## C

- Catalytic Activity and Selectivity on Heterogeneous Surfaces with Mass Transfer ..... 786
- Chromatographic Methods (Book Review) ..... 830
- Comparison of Theoretical Predictions with Published Experimental Measurements on the Blown Film Process ..... 275
- Comprehensive Correlating Equation for Heat and Component Transfer by Free Convection, A ..... 604

- Computational Methods for Cylindrical Catalyst Particles (Erratum) ..... 206
- Concept of Ultimate Volume of Liquid Mixtures, The ..... 195
- Contact Nucleation of Various Crystal Types ..... 351
- Continuous Production of Polystyrene in a Tubular Reactor: Part I. Kinetics ..... 664
- Part II. Mass Transfer Studies ..... 670
- Convergence Promotion in the Simulation of Chemical Processes—The General Dominant Eigenvalue Method ..... 528
- Coordinate-Transformation Method for the Numerical Solution of Nonlinear Minimum-Time Control Problems, A ..... 1158
- Correlation and Prediction of Gas-Liquid Holdups in Inclined Upflows ..... 1189
- Criteria for Thermodynamic Stability, The ..... 824
- Reply ..... 826

## D

- Deborah Number for Diffusion in Polymer-Solvent Systems, A ..... 894
- Decomposition Kinetics of Molybdenite in an Argon Plasma, The Dense Fluid Shear Viscosity and Thermal Conductivity—The Excess ..... 410
- Determination of Hindered Diffusivities of Nonadsorbing Pollutants in Muds ..... 1022
- Dictionary of Rubber (Book Review) ..... 830
- Dielectric Constants and Clausius-Mossotti Functions for Simple Liquid Mixtures: Systems Containing Nitrogen, Argon, and Light Hydrocarbons ..... 283
- Diffusion of Grouped Multicomponent Mixtures in Uniform and Nonuniform Media ..... 192
- Diffusion and Partitioning of Macromolecules within Finely Porous Glass ..... 289
- Diffusion and Reaction in Turbulent Flow of a Power-Law Fluid in a Circular Tube ..... 752
- Diffusional Mass Transfer (Book Review) ..... 621
- Diffusivity Ratios in Fully Developed Turbulent Pipe Flow ..... 169
- Digital Computing and Numerical Methods (Book Review) ..... 203
- Dissipation Effects in Hydrodynamic Stability of Viscoelastic Fluids ..... 901
- Drag Reduction Fundamentals (Journal Review) ..... 625
- Drag Reduction in Film Flow ..... 610
- Drag Reduction in Solid-Fluid Systems ..... 358
- Dropwise Condensation ..... 391
- Drug Permeation Through Human Skin: Theory and in Vitro Experimental Measurement ..... 985
- Dynamic Method for Catalyst Diffusivities, A ..... 58

## E

- Ecokinetics: A Study of the Fate and Distribution of Chemicals in Laboratory Ecosystems ..... 854
- Effect of Colloidal Silica on the Spreading Pressure of Silicon Fluids ..... 1018
- Effect of Vertical Alignment on the Performance of Bubble and Foam Fractionation Columns ..... 400
- Effectiveness Factors in Gas-Liquid Reactions ..... 501
- Effects of Nonseparable Kinetics in Alcohol Dehydration over Poisoned Silica-Alumina ..... 494
- Electroosmosis and Electrolyte Conductance in Charged Microcapillaries ..... 1176
- Elements of Chemical Kinetics and Reactor Calculations: A Self-Paced Approach, The (Book Review) ..... 621
- Enzyme Separation by Parametric Pumping ..... 782
- Estimation of Bubble Diameter in Gaseous Fluidized Beds ..... 109
- Evaluating Flows of Non-Newtonian Fluids by the Method of Equivalent Newtonian Viscosity ..... 198
- Extensional Viscosity and Recoil in Highly Dilute Polymer Solutions ..... 1225

## F

- First World Filtration Congress: Papers Presented (1974), Société de Chimie Industrielle (Book Review) ..... 622
- Flexible Solutions to Linear Programs under Uncertainty: Equality Constraints ..... 83
- Flexible Solutions to Linear Programs under Uncertainty: Inequality Constraints ..... 77
- Flooding Rates and Holdup in Packed Liquid-Liquid Extraction Columns ..... 1080
- Flow Perpendicular to Mats of Randomly Arranged Cylindrical Fibers (Importance of Cell Models) ..... 805
- Flow Phenomena in Stirred Tanks ..... 931
- Formation of Liquid Drops with Uniform and Controlled Diameters at Rates of  $10^3$  and  $10^5$  Drops per Minute ..... 383
- Freeze Dehydration by Microwave Energy: Part I. Theoretical Investigation ..... 335
- Part II. Experimental Study ..... 344
- Functionally Near-Equivalency of Reynolds and Grashof Numbers, The ..... 609
- Fundamentals and Modeling of Separation Processes (Book Review) ..... 1037
- Further Considerations on the Danckwerts-Gillham Method for Design of Gas-Absorbers ..... 815



**Flow Maldistribution in Packed Beds: A Comparison of Measurements with Predictions** 769

**G**

Gas Absorption Accompanied by Instantaneous Bimolecular Reaction in Turbulent Liquids	534
General Analysis for Free Drainage of Non-Newtonian Films from Flat Plates When Inertial and Surface Tension Forces and Normal Stresses are Negligible	487
Generalized Equations of State for Compressed Liquids—Application of Pitzer's Correlation	397
Generalized Isothermal Equation of State for Dense Liquids, A	171
Generalized Prediction of Isothermal Compressibilities and an Isothermal Equation of State for Liquid Mixtures	1024
Generalized Thermodynamic Correlation Based on Three-Parameter Corresponding States, A	510
Erratum	1040
Group-Contribution Estimation of Activity Coefficients in Non-ideal Liquid Mixtures	1086
Grouping of Many Species Each Consumed by Two Parallel First-Order Reactions	865

**H**

Heat, Mass, and Momentum Transport with Turbulent Flow in Smooth and Rough Pipe	1033
Heat Transfer in Fires: Thermophysics, Social Aspects, Economic Impact (Book Review)	413
Holographic Determination of Local Mass Transfer Coefficients at a Solid-Liquid Boundary	184
Hydrogenation of Acetone in a Vibrating Slurry Reactor	730

**I**

Identification and System Parameter Estimation: Parts 1 and 2, Proceedings of the 3rd IFAC Symposium (Book Review)	204
Ignition on Catalytic Wires: Kinetic Parameter Determination by the Heated-Gas Technique	176
Inception Criteria for Droplet Entrainment in Two-Phase Concurrent Film Flow	308
Influence of Polymer Conformation on Turbulent Drag Reduction, The	1027
Instability of Film Coating of Wires and Tubes	775
Interaction of Activated Carbon with Dissolved Oxygen	1200
Interactions Between Catalytic Hydrodesulfurization of Thiophene and Hydrodenitrogenation of Pyridine	1100
Interphase Mass and Heat Transfer in Pulsatile Flow	743
Introduction to Chemical Engineering Analysis (Book Review)	413
Introduction to Process Economics (Book Review)	622
Investigation of Anomalous Osmosis and Thermoosmosis, An	229
Ion Pair Formation Model for Sea Salt Solutions	600

**K**

Kinetics and Mechanisms of Polymerization Reactions, Applications and Physicochemical Principles (Book Review)	414
Kinetics of Solid Phase Reactions	756

**L**

Laminar Two-Dimensional Non-Newtonian Jets	385
Light Distribution in Cylindrical Photoreactors	1207
Limits of Superheat and Explosive Boiling of Light Hydrocarbons, Halocarbons and Hydrocarbon Mixtures	560
Linear Driving Force Approximations for Diffusion Controlled Adsorption in Molecular Sieve Columns	200
Liquefied Natural Gas (Book Review)	412
Liquefied Petroleum Gases: Guide to Properties, Applications and Usage of Propane and Butane (Book Review)	412
Liquid Thermal Conductivity—A Data Survey to 1973 (Book Review)	414

**M**

Magnetofluidynamic Separation of a Binary Gas	615
Mass Transfer Coefficients and Interfacial Areas in Agitated Dispersions	407
Mass Transfer in Nonuniform Packing	396
Mass Transfer Studies Across Liquid/Liquid Interfaces (Use of an Analytical Ultracentrifuge)	103
Mathematical Definition of Chocking Phenomena and a Mathematical Model for Predicting Chocking Velocity and Choking Voidage, A	1013
Mathematical Modeling of Atomizing Scrubbers	153
Mathematical Theory of Diffusion and Reaction in Permeable Catalysts, Vol. 1 (Book Review)	1037
McGraw-Hill Dictionary of Scientific and Technical Terms, The (Book Review)	206
Mechanics of Steady Spinning of a Viscoelastic Liquid	791
Membranes with Common Ion Pumping	160
Membrane Ultrafiltration of a Non-ionic Surfactant and Inorganic Salts from Complex Aqueous Suspensions: Design for Water Reuse	1057
Method of Evaluation and Reduction of Vapor-Lined Equilibrium Data of Binary Mixtures	735
Method of Temperature Estimation in the Bubble Point Method of Iterative Distillation Calculations	1223
Migration of Two Liquid Phases in Capillary Extrusion: An Energy Interpretation	1204
Model Discrimination and Parameter Estimation in Heterogeneous Catalysis	1041

Mixing in the Interaction Zone of Two Free Jets	949
Modeling of Heterogeneous Systems in a Plasma Jet Reactor	879
Molecular Rheology of Polymer Solutions: Interpretation and Utility (Journal Review)	1
Multicomponent Distillation Simulation—Distillation of Air	327
Multicomponent Mass Transfer in Turbulent Flow (Erratum)	830

**N**

Natural Convection with Mercury in a Uniformly Heated Vertical Channel During Unstable Laminar and Transitional Flow	268
New Method for Nonlinearly Constrained Optimization, A	479
New Methods for the Estimation of the Viscosity Coefficients of Pure Gases at Moderate Pressures (with Particular Reference to Organic Vapors)	181
New Network Permeability Model of Porous Media	299
New Stabilizing Index to Correlate Foam Height, A	599
New Technique for Collecting Binary Vapor-Liquid Equilibrium Data without Measuring Composition: The Method of Intersecting Isochores, A	1111
Nonlinear Theory of Free Coating onto a Vertical Surface	958
Non-Newtonian Heat Transfer in the Thermal Entrance Region of Uniformly Heated, Horizontal Pipes	699
Numerical Treatment of Laminar Flow in Helically Coiled Tubes of Square Cross Section: Part I. Stationary Helically Coiled Tubes	965
Part II. Oscillating Helically Coiled Tubes	974

**O**

On the Influence of Liquid Elasticity on Mixing in a Vessel Agitated by a Combined Ribbon-Screw Impeller	613
On the Prediction of Ultimate Separation in Parametric Pumps	1149
On the Regeneration of Fixed Adsorber Beds	380
On Spatial Formulation of the Orr-Sommerfeld Equation for Thin Liquid Films	178
On the Statistical Sensitivity Analysis of Models for Chemical Kinetics	441
Onset of Fluidization and Slugging in Beds of Uniform Particles	238
Optimal Decomposition of Process Networks	656
Optimal Temperature Policy for Reversible Reactions with Deactivation: Applied to Enzyme Reactors (Errata)	622, 830
Optimal Truncation of the Virial Equation	406
Oscillating Behavior of Distillation Trays—II	41
Oscillations on Sieve Trays	1019
Oxidation of Petrochemicals: Chemistry and Technology (Book Review)	1038

Optimal Batch Reactor Temperature Policy for Reactions with Concentration-Dependent Catalyst Decay .....	1029
Oxygen Reduction at an Anodically Activated Platinum Rotating Disc Electrode .....	763
Oxygen Transfer in Fermentation ..	979

## P

Particle-Gas Dispersion Effects in Confined Coaxial Jets .....	372
Penetration of Vertical Jets into Fluidized Beds .....	507
Perturbed Hard-Chain Theory: An Equation of State for Fluids Containing Small or Large Molecules .....	1123
Petroleum Evaluations and Economic Decisions .....	1235
Phase Inversion in Sieve Trays .....	1210
Phase Separation of Primary Dispersions in Beds Packed with Spherical Packings .....	910
Physical Properties of Inorganic Compounds (Book Review) ..	830
Polymer Moment Equations for Distributed Parameter Systems ..	404
Polymer Conversion (Book Review) ..	1236
Porous-Electrode Theory with Battery Application (Journal Review) ..	25
Prediction of Azeotropic Behavior and Saturated Liquid Densities in the Carbon Dioxide-Ethane System .....	618
Prediction of Dynamic Temperature Distributions in the Human Body .....	1006
Prediction of the Pressure Drop Across Sieve Trays .....	1218
Prediction of "Tortuosity Factors" from Pore Structure Data .....	820
Prediction of Unsymmetric Conventional Liquid-Phase Activity Coefficients of Hydrogen and Methane .....	157
Probability Models in Reaction Path Synthesis .....	1233
Problem Approximation for Stiff Ordinary Differential Equations ..	1227
Process Reliability Analysis .....	677
Product Design and Process Engineering (Book Review) .....	414
Pseudoplastic Falling Films with Concurrent Gas Streams .....	861
Pseudo Steady State Approximation for the Numerical Integration of Stiff Kinetic Systems .....	817
Pyridine Hydrodenitrogenation: An Equilibrium Limitation on the Formation of Piperidine Intermediate .....	1107

## Q

Quantitative Overdesign of Chemical Processes .....	436
---	-----

## R

Radiative Transfer and Interactions with Conduction and Convection (Book Review) .....	203
--	-----

Real-Time Time-Optimal Control of a Stirred-Tank Reactor Using Kalman Filtering for State Estimation .....	799
Reasonable Gibbsian Definition of the Dew Point and its Experimental Verification, A .....	168
Reduction and Removal of SO <sub>2</sub> and NO <sub>x</sub> from Simulated Flue Gas Using Iron Oxide as Catalyst/Absorbent .....	466
Remarks on the Rate of Formation of Bisulfate Ions in Aqueous Solution .....	402
Reply to the Note of Roger and Villiermaux .....	1209
Reply to Notter and Sleicher Note ..	170

## S

Second Virial Coefficients of Polar Haloalkanes .....	827
Secondary Nucleation Due to Fluid Forces upon a Polycrystalline Mass of Ice .....	392
Selecting Engineering Materials for Chemical and Process Plant (Book Review) .....	412
Selection of Decompositions for Chemical Process Simulation ..	136
Self-Generated Oscillations in Continuous Crystallizers: Part I. Analytical Prediction of the Oscillating Output .....	917
Part II. An Experimental Study of an Isothermal System .....	924
Separation of Boron Isotopes by Direct Mode Thermal Parametric Pumping .....	807
Separation of Isomers via Thermal Parametric Pumping .....	813
Solution for the Oxygen Mass Transfer Problem in Immobilized Enzyme Systems, A .....	822
Some Fundamental Aspects of Spray Drying .....	143
Some Liquid Holdup Experimental Data in Trickle-Bed Reactors for Foaming and Nonfoaming Hydrocarbons .....	1213
Some Notes on the Temperature Response of Packed Beds .....	388
Spatially Browning Disturbances in Liquid Films .....	594
Spouted Beds (Book Review) .....	623
Stability of Moving Surfaces in Fluid Systems with Heat and Mass Transport: III. Stability of Displacement Fronts in Porous Media .....	474
Stability of Nuclei Generated by Contact Nucleation, The .....	1017
Statistical Characteristics of Thin, Wavy Films .....	583
Statistical Thermodynamics of Liquid Mixtures: A New Expression for the Excess Gibbs Energy of Partly or Completely Miscible Systems .....	116
Steady State Chemical Process Simulation (Journal Review) .....	417
Steady State Multiplicity of Adiabatic Gas-Liquid Reactors: I. The Single Reaction Case ....	318

Stresses and Friction Forces in Moving Packed Beds .....	720
Sulfur Dioxide Oxidation in Slurries of Activated Carbon Part I. Kinetics .....	664
Part II. Mass Transfer Studies .....	670
Synthesis of Fault Tolerant Reaction Paths .....	90
Erratum .....	693
Synthesis of Separation Sequence by Ordered Branch Search .....	885
Systems Approach to Air Pollution Control (Book Review) .....	412

## T

Tables on the Thermophysical Properties of Liquids and Gases, 2nd edition (Book Review) .....	1235
Temperature Excursions in Catalytic Monoliths .....	849
Ternary Mass Transfer in Liquid-Liquid Extraction .....	554
Thermal Cracking of Propane and Propane-Propylene Mixtures: Pilot Plant Versus Industrial Data .....	1065
Thermal Effects in Gas Absorption ..	96
Thermodynamic Consistency Using Orthogonal Collocation or Computation of Equilibrium Vapor Compositions at High Pressures ..	49
Thermodynamic Method of Predicting the Transport of Steroids in Polymer Matrices, A .....	1073
Thermodynamics (2nd Edition) (Book Review) .....	1038
Thermodynamics and Its Applications (Book Review) .....	203
Thermodynamics of Aqueous Solutions Containing Volatile Weak Electrolytes .....	248
Transfer Coefficient in Pulsating Pipe Flow: Comments on an Article by Patel et al .....	1035
Reply .....	1036
Transient Viscoelastic Flow of Polymer Solutions .....	999
Transport of Mass in Ternary Liquid-Liquid Systems Part I. Diffusion Studies .....	571
Part II. Mass Transfer and Interfacial Studies .....	575
Trickle-Bed Reactor Performance Part I. Holdup and Mass Transfer Effects .....	706
Part II. Reaction Studies .....	714
Trickle-Bed Reactors (Journal Review) .....	209
Turbulent Motion, Mixing and Kinetics in a Chemical Reactor Configuration .....	1165
Two Kinds of Self-Preserving Size Spectra of a Cloud of Particles ..	128

## U

Unlike Pair Potential Interaction Force Constants for Hydrogen-Light Hydrocarbon Systems ..	173
Unsteady State Method for Measuring the Permeability of Small Tubular Membranes, An .....	1192

# V

## Vapor-Liquid Equilibrium

- Part III. Data Reduction with  
Precise Expressions for  $G^E$  ..... 62  
Part IV. Reduction of P-x Data  
for Ternary Systems ..... 72

- Vapor-Liquid Equilibrium of the  
Hydrogen-n-Butane System at  
Elevated Pressures, The ..... 1142  
Various Types of Instabilities on a  
Falling Liquid Film ..... 190  
Viscoelastic Effect of Polymers on  
Single Bubble Dynamics ..... 810

- Void-Fraction Correlation for Verti-  
cal and Horizontal Bulk-Boiling  
of Waters ..... 607

# W

- Wall Mass Transfer in Laminar  
Pulsatile Flow in a Tube ..... 259

# Subjects

## A

- Absorber beds,  
regeneration of ..... 380  
Absorbers, gas  
design of ..... 815  
Absorption, gas  
thermal effects in ..... 96  
Absorption, gas  
in turbulent liquids ..... 534  
Acetone,  
hydrogenation of ..... 730  
Activity coefficients,  
in nonideal liquid mixtures ..... 1086  
Activity coefficients, liquid-phase  
of hydrogen and methane ..... 157  
Adsorption,  
in molecular sieve columns,  
linear driving force  
approximations for ..... 200  
Air,  
distillation of,  
mathematical model of ..... 327  
Air pollutants,  
removal from flue gas ..... 466  
Alcohol,  
dehydration of over poisoned  
silica-alumina ..... 494

## B

- Barker's method,  
use in reduction of vapor-  
liquid equilibria data ..... 62, 72  
Batteries,  
use of porous electrodes in ..... 25  
Bimolecular reaction,  
gas absorption accompanied  
by ..... 534  
Bisulfite ions,  
rate of formation of  
in aqueous solutions ..... 402  
Blown film process ..... 275  
Boiling, explosive,  
of hydrocarbons and halo-  
carbons ..... 560  
Boron isotopes,  
separation of by parametric  
pumping ..... 807  
Bubble nucleation ..... 833  
Bubble point,  
estimation of in  
distillation calculations ..... 1223  
Bubbles,  
estimation of diameters in  
gaseous fluidized beds ..... 109  
Bubbling,  
in fluidized beds ..... 238  
n-Butane-hydrogen system,  
vapor-liquid equilibrium of ..... 1142

## C

- Carbon, activated,  
interaction with  
dissolved oxygen ..... 1200  
Carbon dioxide-ethane system,  
azeotropic behavior and  
liquid densities in ..... 618  
Catalysis, heterogeneous ..... 602  
Catalysis,  
heterogeneous model  
discrimination and parameter  
estimation in ..... 1041  
Catalysts,  
activity and selectivity of on  
heterogeneous surfaces ..... 786  
Catalysts,  
concentration dependent  
decay of ..... 1029  
Catalysts,  
diffusivity of,  
determination of using pulse-  
response technique ..... 58  
Catalytic monoliths,  
heat generation in ..... 849  
Catalytic wires,  
ignition on ..... 176  
Chemical processes,  
selection of decompositions for,  
simulation of ..... 136  
Choking,  
in pneumatic conveying ..... 1013  
Clausius-Mossotti functions,  
for liquid mixtures ..... 283  
Coating, film,  
instability of on wires and  
tubes ..... 775  
Coating, free  
onto vertical surface ..... 958  
Columns, distillation,  
effect of alignment on  
performance of ..... 400  
Columns, extraction,  
packed liquid-liquid ..... 1080  
Compressibilities, isothermal,  
for liquid mixtures ..... 1024  
Computers,  
use in simulation of chemical  
processes ..... 417  
Condensation, dropwise ..... 391  
Conductance,  
electrolyte in charged  
microcapillaries ..... 1176  
Conductivity, thermal excess ..... 410  
Constraints, nonlinear,  
involved in optimization  
problems ..... 479  
Control, time-optimal,  
of stirred-tank reactor ..... 799

- Control problems,  
nonlinear minimum time,  
numerical solution of ..... 1158  
Convention, natural,  
with mercury ..... 268  
Conveying, pneumatic,  
choking in ..... 1013  
Coordinate-transformation method  
for solution of control  
problems ..... 1158  
Corresponding states,  
thermodynamic correlation  
based on ..... 510  
Cracking, thermal,  
of propane and propane-  
propylene mixtures ..... 1065  
Crystallizers, continuous,  
self-generated oscillations  
in ..... 917, 924  
Crystals,  
contact nucleation of ..... 351

## D

- Deborah number,  
for diffusion in polymer-solvent  
systems ..... 894  
Decomposition, optimal,  
of process networks ..... 656  
Decomposition kinetics,  
of molybdenite ..... 1132  
Decompositions,  
selection of for chemical process  
simulation ..... 136  
Dehydration,  
of methanol and ethanol over  
poisoned silica-alumina ..... 494  
Design, over-  
of chemical processes ..... 436  
Dew point,  
definition of ..... 168  
Dielectric constants,  
for liquid mixtures ..... 283  
Differential equations,  
problem approximation  
for ..... 1227  
Diffusion,  
Deborah number for in polymer-  
solvent systems ..... 894  
Diffusion,  
of multicomponent mixtures ..... 192  
Diffusivities,  
of nonabsorbing pollutants  
in muds ..... 1022  
Diffusivity,  
of catalysts,  
determination of using pulse-  
response technique ..... 58  
Diffusivity ratios,  
in turbulent pipe flow ..... 169, 170

Displacement fronts in porous media, stability of .....	474	Equilibrium vapor compositions, calculation of using orthogonal collocation .....	49	Fluidized beds, gaseous, estimation of bubble diameters in .....	109
Distillation, multicomponent, simulation of .....	327	Ethane-carbon dioxide system, azeotropic behavior and liquid densities in .....	618	Fluids, non-Newtonian, evaluation of flows of .....	198
Distillation calculations, iterative, temperature estimation in bubble point method of .....	1223	Extraction, liquid-liquid, ternary mass transfer in .....	554	Fluids, viscoelastic, hydrodynamic stability in .....	901
Distillation trays, oscillating behavior on .....	41	Extraction columns, packed liquid-liquid .....	1080	Foam, correlation of height of .....	599
Drag reduction, in film flow .....	610	Extrusion, capillary, migration of two phases in .....	1204	Force constants, for hydrogen-light hydrocarbon systems .....	173
Drag reduction, in solid-fluid systems .....	358	<b>F</b>		Freeze drying, by microwave energy .....	335, 344
Drag reduction, in turbulent pipe flow .....	625	Fermentation, oxygen transfer in .....	979	<b>G</b>	
Drag reduction, turbulent, effect of polymer conformation on .....	1027	Fiber mat, flow perpendicular to .....	805	Gas, binary, magnetofluidynamic separation of .....	615
Drainage, of non-Newtonian films from flat plates .....	487	Film, falling liquid, instabilities on .....	190	Gas absorption, thermal effects in .....	96
Droplets, entrainment of in two-phase concurrent film flow .....	308	Film flow, drag reduction in .....	610	Gases, pure, estimation of viscosity coefficients of .....	181
Drops, liquid, formation of .....	383	Film flow, entrainment of droplets in .....	308	Gibbs energy, excess, of liquid mixture .....	116
Drugs, permeation through human skin .....	985	Films, falling, pseudoplastic .....	861	Glass, finely porous, diffusion and partitioning of macromolecules in .....	289
Dryer, spray, motion of droplets in .....	143	Films, liquid, disturbances in .....	594, 596	Grashof number, functionally near-equivalency of and Reynolds number .....	609
Drying, freeze, by microwave energy .....	335, 344	Films, non-Newtonian, analysis of free drainage of from flat plates .....	487	<b>H</b>	
Dynamic systems, analysis of .....	567	Films, thin, wavy, statistical characteristics of .....	583	Haloalkanes, polar, second virial coefficients for .....	827
Dynamics, single bubble, viscoelastic effect of polymers on .....	810	Flow, in cylindrical fibers .....	805	Heat, generation and distribution in catalytic monoliths .....	849
<b>E</b>		Flow, in stirred tanks .....	931	Heat transfer, by free convection .....	604
Ecokinetics .....	854	Flow, of non-Newtonian fluids .....	198	Heat transfer, in pulsatile flow .....	743
Ecosystems .....	854	Flow, laminar, in helically coiled tubes .....	965, 974	Heat transfer, in turbulent pipe flow .....	187
Effectiveness factors, in gas-liquid reactions .....	501	Flow, laminar pulsatile, mass transfer in .....	259	Heat transfer, with turbulent flow in pipes .....	1033
Eigenvalue method, use in chemical process simulation .....	528	Flow, pulsatile, heat and mass transfer in .....	743	Heat transfer, with wavy/stratified gas-liquid flow .....	872
Elasticity, liquid, influence on mixing .....	613	Flow, pulsating, in pipes, transfer coefficient in .....	1035, 1036	Heat transfer, non-Newtonian, in horizontal pipes .....	699
Electrodes, porous, applications in batteries .....	25	Flow, turbulent, in pipes, analysis of .....	187	Heat transfer correlations, for natural convection in mercury .....	268
Electrolytes, weak, thermodynamics of aqueous solutions of .....	248	Flow, turbulent, in pipes, drag reduction in .....	625	Heterogeneous surfaces, catalytic activity and selectivity on .....	786
Electroosmosis, in charged microcapillaries .....	1176	Flow, turbulent, of power-law fluid .....	752	Holdup, in trickle-bed reactors .....	1213
Entrainment, of droplets in two-phase concurrent film flow .....	308	Flow, viscoelastic, of polymer solutions .....	999	Holdup, gas-liquid, in inclined upflows .....	1189
Environment, study of effect on chemicals using ecosystems .....	854	Flow maldistribution, in packed beds .....	769	Human body, dynamic temperature distributions in .....	1006
Enzyme systems, solution for oxygen mass transfer problem in .....	822	Flue gas, removal of SO <sub>2</sub> and NO <sub>x</sub> from using iron oxide .....	466	Hydrodenitrogenation, of pyridine .....	1100, 1107
Enzymes, separation of by parametric pumping .....	782	Fluid power-law, flow through expansion .....	540, 550	Hydrodesulfurization, of thiophene .....	1100
Equality constraints .....	83	Fluid, power-law, turbulent flow of .....	752	Hydrogen, liquid-phase activity coefficients of methane and .....	157
Equation of state, for compressed liquids .....	397	Fluid, viscoelastic, turbulent pipe flow for .....	597	Hydrogen-n-butane system, vapor-liquid equilibrium of .....	1142
Equation of state, for fluids .....	1123	Fluidization, onset in beds of uniform particles .....	238	Hypothetical component method, for distillation calculations .....	1223
Equation of state, isothermal, for dense liquids .....	71	Fluidized beds, penetration of vertical jets into .....	507		
Equation of state, isothermal, for liquid mixtures .....	1024				



	I		Mass transfer, ternary, in liquid-liquid extraction . . . . .	554	Nucleation, contact, stability of nuclei generated by . . . . .	1017
109	Ice, polycrystalline, secondary nucleation in . . . . .	392	Mass transfer coefficients, holographic determination of at solid-liquid boundary . . . . .	184	Nucleation, secondary, in polycrystalline ice . . . . .	392
198	Inequality constraints Integration, numerical, of kinetic systems . . . . .	817	Mass transfer coefficients, in agitated dispersions . . . . .	407	Nuclei, stability of when generated by contact nucleation . . . . .	1017
901	Interfacial areas, in agitated dispersions . . . . .	407	Mathematical model, for chemical kinetics, sensitivity analysis of . . . . .	441	O	
599	Ion pumping . . . . .	160	Mathematical model, of particle collection efficiency in atomizing scrubbers . . . . .	153	Optimization, by linear programming . . . . .	77, 83
173	Isochores, intersecting, collection of vapor equilibrium data by . . . . .	1111	Membranes, small tubular, permeability of . . . . .	1192	Optimization, nonlinearly constrained . . . . .	479
335, 344	Isomers, separation of by parametric pumping . . . . .	813	Mercury, heat transfer correlations for natural convection in . . . . .	268	Optimization, of reaction networks from unreliable reactions . . . . .	90
	J		Methane, liquid-phase activity coefficients of hydrogen and . . . . .	157	Orr-Sommerfeld equation, for thin liquid films . . . . .	178, 179
615	Jet, turbulent liquid, breakup in low-pressure atmosphere . . . . .	996	Methyl methacrylate, photopolymerization of . . . . .	1115	Orthogonal collocation, use to calculate equilibrium vapor compositions . . . . .	49
96	Jets, coaxial, particle-gas dispersion in . . . . .	372	Microcapillaries, electroosmosis and electrolyte conductance in . . . . .	1176	Oscillations, on distillation trays . . . . .	41
181	Jets, free, mixing in interaction zone of . . . . .	949	Microwave energy, use in freeze drying . . . . .	335, 344	Oscillations, on sieve trays . . . . .	1019
116	Jets, laminar two-dimensional, non-Newtonian . . . . .	385	Mixing, in chemical reactor . . . . .	1165	Oscillations, self-generated, in continuous crystallizers . . . . .	317, 924
289	Jets, vertical, penetration of into fluidized beds . . . . .	507	Mixing, in coaxial jets . . . . .	372	Osmosis, anomalous . . . . .	229
	K		Mixing, in interaction zone of two free jets . . . . .	949	Overdesign, of chemical processes . . . . .	436
609	Kalman filtering, time-optimal control of stirred- tank reactor using . . . . .	799	Mixing, influence of liquid elasticity on . . . . .	613	Oxidation, of sulfur dioxide in activated carbon . . . . .	664, 670
	Kinetic systems, numerical integration of . . . . .	817	Mixtures, behavioral features of in two parallel first-order reactions . . . . .	865	Oxygen, reduction of, using rotating disk electrode . . . . .	763
827	Kinetics, in chemical reactor . . . . .	1165	Mixtures, binary, evaluation and reduction of vapor-liquid equilibrium data of . . . . .	735	Oxygen, sorption of on activated carbon . . . . .	1200
849	Kinetics, of solid phase reactions . . . . .	756	Mixtures, liquid, isothermal compressibilities and isothermal equation of state for . . . . .	1024	Oxygen, transfer problems of in enzyme systems . . . . .	822
604	Kinetics, chemical, sensitivity analysis of models for . . . . .	441	Mixtures, liquid, thermodynamics of . . . . .	116	Oxygen transfer, in fermentation . . . . .	979
743	L		Mixtures, liquid, ultimate volume of . . . . .	195	P	
187	Liquid, viscoelastic, steady spinning of . . . . .	791	Mixtures, liquid, nonideal, activity coefficients in . . . . .	1086	Packed beds, flow maldistribution in . . . . .	769
1033	Liquid jet, turbulent, breakup in low-pressure atmosphere . . . . .	996	Mixtures, multicomponent, diffusion of . . . . .	192	Packed beds, phase separation in . . . . .	910
872	Liquid-liquid systems, ternary, mass transfer in . . . . .	571, 575	Model discrimination, in heterogeneous catalysis . . . . .	1041	Packed beds, stresses and friction forces in . . . . .	720
699	Liquids, compressed, equations of state for . . . . .	397	Molecular sieve columns, adsorption in . . . . .	200	Packing, nonuniform, mass transfer in . . . . .	396
268	Liquids, pseudoplastic . . . . .	861	Molecular weight characteristics, in homopolymer systems . . . . .	404	Parameter estimation, in heterogeneous catalysis . . . . .	1041
	M		Molybdenite, decomposition kinetics of . . . . .	1132	Particles, size distribution in cloud of . . . . .	128
786	Macromolecules, diffusion and partitioning of in finely porous glass . . . . .	289	Momentum transfer, with turbulent flow in pipes . . . . .	1033	Performance, of bubble and foam fractionation columns, effect of alignment on . . . . .	400
1213	Mass transfer, by free convection . . . . .	604	Muds, diffusivities for nonadsorbing pollutants in . . . . .	1022	Permeability, of porous media, mathematical model of . . . . .	299
1189	Mass transfer, in laminar pulsatile flow . . . . .	259	N		Permeability, of small tubular membrane . . . . .	1192
1006	Mass transfer, in nonuniform packing . . . . .	396	Nucleation, bubble, in liquids . . . . .	833	Perturbed hard-chain theory . . . . .	1123
1100, 1107	Mass transfer, in pulsatile flow . . . . .	743	Nucleation, contact, of various crystal types . . . . .	351	Photoreactors, cylindrical . . . . .	1207, 1209
1100	Mass transfer, in ternary liquid-liquid systems . . . . .	571, 575			Pipe, turbulent flow in . . . . .	597
157	Mass transfer, studies of using ultra- centrifuge . . . . .	103				
1142	Mass transfer, with turbulent flow in pipes . . . . .	1033				

Pipes, horizontal, non-Newtonian heat transfer in .....	699	Pumps, parametric, prediction of ultimate separation in .....	1149	Sieve trays, oscillations on .....	1019
Pitzer's correlation .....	397	Pyridine, hydrodenitrogenation of .....	1100, 1107	Sieve trays, phase inversion on .....	1210
Plasma jet reactors, modeling of heterogeneous systems in .....	879	<b>R</b>		Sieve trays, pressure drop across .....	1218
Pollutants, nonadsorbing, diffusivities of in muds .....	1022	Reaction network, synthesis of from unreliable reactions .....	90	Silica, colloidal, effect of on spreading pressure of silicone fluids .....	1016
Polyethylene, manufacture of in high pressure tubular reactor .....	449	Reaction path synthesis, probability models in .....	1233	Silicone fluids, effect of colloidal silica on spreading pressure of .....	1016
Polymer conformation, effect on turbulent drag reduction .....	1027	Reactions, first-order, behavioral features of mixtures in .....	865	Simulation, of chemical processes .....	136
Polymer matrices, transport of steroids in .....	1073	Reactions, free-radicals, mechanism discrimination in .....	1220	Simulation, of steady state chemical processes by computers .....	417
Polymer melt, shape and velocity of in blown film process .....	275	Reactions, gas-liquid, effectiveness factors in .....	501	Size distribution, in cloud of particles .....	128
Polymer moment equations, for distributed parameter systems .....	404	Reactions, solid phase, kinetics of .....	756	Skin, human, drug permeation through .....	985
Polymer solutions, blending of .....	1230	Reactors, adiabatic gas- liquid .....	318	Slugging, in fluidized beds .....	238
Polymer solutions, molecular rheology of .....	1	Reactors, batch, optimal temperature policy for .....	1029	Solid-fluid systems, drag reduction in .....	358
Polymer solutions, viscoelastic flow of .....	999	Reactors, plasma jet, modeling of heterogeneous systems in .....	879	Spinning, steady, of viscoelastic liquid .....	791
Polymer solutions, highly dilute, extensional viscosity and recoil in .....	1225	Reactors, stirred-tank, time-optimal control of .....	799	Spray drying .....	143
Polymers, viscoelastic effect of on single bubble dynamics .....	810	Reactors, trickle-bed, holdup in .....	209	Stability, hydrodynamic, of viscoelastic fluids .....	901
Polystyrene, production of in tubular reactor .....	686, 691	Reactors, trickle-bed, performance of .....	706, 714	Stabilizing index, use in correlating foam height .....	599
Porous media, mathematical model of permeability of .....	299	Reactors, tubular, production of polystyrene in .....	686, 691	Steroids, transport of in polymer matrices .....	1073
Porous media, stability of displacement fronts in .....	474	Reactors, tubular, high pressure, use in polymerization of ethylene .....	449	Stirred tank reactor, model of .....	318
Pressure drop, across sieve trays .....	1218	Reactors, vibrating slurry, hydrogenation of acetone in ...	730	Styrene, photopolymerization of .....	1115
Probability models, in reaction path synthesis .....	1233	Recoil, in highly dilute polymer solutions .....	1225	Sulfur dioxide, oxidation of in activated carbon .....	664, 670
Process networks, recycle, decomposition of .....	656	Reliability, of representations of process systems .....	677	Superheat, limits of of hydrocarbons and halo- carbons .....	560
Process systems, reliability of representations of .....	677	Reynolds Number, functionally near-equivalency of and Grashof Number .....	609	Surface, vertical, free coating onto .....	958
Processes, chemical, convergence promotion in simulation of .....	528	Rheology, molecular, of polymer solutions .....	1	Suspensions, aqueous, membrane ultrafiltration of .....	1057
Processes, chemical, overdesign of .....	436	Rotating disk electrode, reduction of oxygen using .....	763	Systems, time-delay, analysis of by series of approximation .....	567
Processes, chemical, simulation of .....	417	<b>S</b>		<b>T</b>	
Programming, linear, use in optimization .....	77, 83	Salt solution and seawater, reduction of oxygen in .....	763	Tanks, stirred, flow phenomena in .....	931
Propane and propane- propylene mixtures, thermal cracking of .....	1065	Scrubbers, atomizing, mathematical models of .....	153	Temperature distributions, dynamic, in human body .....	1006
Propylene-propane mixtures, thermal cracking of .....	1065	Sea salt solutions, ion pair formation model for ...	600	Temperature response, of packed beds .....	388
Pumping, ion .....	160	Sensitivity matrix, for mathematical model .....	441	Thermodynamic consistency, using orthogonal collocation ...	49
Pumping, parametric, enzyme separation by .....	782	Separation, magnetofluidynamic, of binary gas .....	615	Thermodynamic correlations, based on corresponding states .....	510
Pumping, parametric, separation of boron isotopes by .....	807	Separation, prediction of ultimate in parametric pumps .....	1149	Thermodynamic properties, of sea salt .....	600
Pumping, parametric, separation of isomers by .....	813	Separation, phase, in packed beds .....	910	Thermodynamic stability, criteria for .....	824, 826
		Separation sequences, multicomponent, synthesis of .....	885	Thermodynamics, of aqueous solutions of weak electrolytes .....	248
				Thermodynamics, of liquid mixtures .....	116
				Thermooosis, anomalous .....	229

1019	Thiophene, hydrodesulfurization of	1100	Ultrafiltration, membrane	1057	Viscosity, excess shear	410
1210	Tortuosity factors, prediction of	820	Upflows, inclined, gas-liquid holdups in	1189	Viscosity, extensional in highly dilute polymer solutions	1225
1218	Tracers, use in studies of heterogeneous catalysis	602	<b>V</b>			
1016	Transfer coefficient, in pulsating pipe flow	1035, 1036	Vapor-liquid equilibrium, of binary mixtures, evaluation and reduction of	735	Viscosity coefficients, of pure gases, estimation of	181
	Trickle-bed reactors	209	Vapor-liquid equilibrium, of binary systems	62	Von Karman analogy	872
1016	Tubes, instability of coating on	775	Vapor-liquid equilibrium, of binary systems, collection of data by method of intersecting isochores	1111	<b>W</b>	
136	Tubes, helically coiled, laminar flow in	965, 974	Vapor-liquid equilibrium, of hydrogen-n-butane system	1142	Water, bulk-boiling of, void-fraction correlation for	607
	Turbulence, in chemical reactor	1165	Vapor-liquid equilibrium, of ternary systems	72	Water, reuse of	1057
417	<b>U</b>		Virial coefficients, second, for polar haloalkanes	827	Wires, instability of coating on	775
128	Ultimate volume, of liquid mixtures	195	Virial equation, truncation of	406	Wires, catalytic, ignition on	176
985	Ultracentrifuge, use in studies of mass transfer in liquid/liquid systems	103				
238						
358						
791						
143						
901						
599						
1073						
318						
1115						
664, 670						
560						
958						
1057						
567						
931						
1006						
388						
49						
510						
600						
824, 826						
248						
116						
229						